second theme is laboratory studies. Both Anderson and Sitar (Chapter 1), in examining variations of measured strength parameters for the same material using different test regimes, and Watry and Ehlig (Chapter 2), in determining the best laboratory method for establishing the residual factor of safety, conclude that sample preparation and test conditions can result in big differences in measured material properties rather than variations being a true reflection of field conditions. Wong *et al*. (Chapter 3) use the triaxal test to determine viscoplastic soil parameters required for the application of Iversons's (1985) viscoplastic constitutive model.

There are three chapters which focus on the weathering of argillaceous materials and implications for slope stability. Dick and Shakoor (Chapter 8) consider mudrock durability and relationships between durability and mass movement type. Shakoor (Chapter 9) examines failures where undercutting has resulted from the differential weathering of two juxtaposed strata. Watters and Delahaut (Chapter 10) examine the argillic alteration which accompanies hot, hydrothermal fluids and the consequent reduction in rock mass strength. Finally, there are two papers which develop modelling themes. Michaelowski (Chapter 4) suggests that the limit analysis approach to determining slope instability makes less arbitrary static assumptions than alternative approaches – such as the inclination of forces between slices in limit equilibrium methods – and is therefore more accurate. The second, by Haneberg (Chapter 5), reports the effects of steady groundwater on the stability of heterogeneous infinite slopes underlain by impervious strata.

The contents of the volume are varied in their appeal to geomorphologists. Some sections are of general interest, examples being the evaluation of viscoplastic slope movements (Chapter 3) and examination of the geology, hydrology and mechanics of a slow-moving, clay-rich landslide in Honolulu (Chapter 6). Others are less significant where, for example, the data focus on a specific site for engineering purposes. The volume is well produced; tables and figures are on the whole clear and relevant. In summary, this is a volume with contributions of interest to geomorphologists. For those with slope stability research interests in soft earth materials a foray into the text, even if only briefly, will be time well spent during a visit to the library and will probably suffice, rather than calling at the book shop to place an order.

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MATERIAL FLUXES ON THE SURFACE OF THE EARTH edited for the National Research Council, National Academy Press, Washington, 1994. No. of pages: xiv + 170. Price: £32.95. ISBN 0-309-04745-5.

VARIABILITY IN STREAM EROSION AND SEDIMENT TRANSPORT edited by L. J. Olive, R. J. Loughran and J. A. Kesby, International Association of Hydrological Sciences Publication No. 224, IAHS Press, Wallingford, 1994. No. of pages: x + 498. Price: £75.00. ISBN 0-947571-19-1.

These volumes provide very different perspectives on the transport of materials at the surface of the Earth and have been published in response to different aims and objectives. *Material Fluxes on the Surface of the Earth* (*Material Fluxes*) is the 19th in a series of *Studies in Geophysics* published since 1977 to provide a source of information to assist policy-makers in decision-making, and to assess emerging research topics in geophysics. By contrast, *Variability in Stream Erosion and Sediment Transport* (*Variability in Erosion*) is the latest conference publication emanating from the International Committee on Continental Erosion of the International Association of Hydrological Sciences. This conference theme was chosen to focus on the role of variability in erosion and sediment transport and especially in the establishment of adequate research and monitoring designs.

Through ten review chapters and an overview, *Material Fluxes* publishes a report of the Board on Earth Sciences and Resources to the US National Research Council. The purpose of the report was: (1) to provide an overview of the state of knowledge on modern and late Pleistocene material fluxes; (2) to evaluate the variability in process rates over the same time scale; (3) to assess the extent to which measurement of modern fluxes incorporates an estimate of anthropogenic impact; (4) to identify the variability of process rates in terms of changing and fluctuating rates over different time scales; (5) to disclose important gaps in existing material flux estimates; and (6) to suggest how knowledge of natural variability may be incorporated into models of future change. It was with considerable optimism that I began reading this report, and this was stimulated by a well-written overview which attempted to synthesize the main body of the report in order to meet these six objectives. Whilst it was somewhat disturbing to be presented with unequivocal evidence that the current state of knowledge of global fluxes of most materials is poor, this chapter identified a number of critical knowledge gaps which need to be filled by scientific research. However, I was disappointed by the lack of a global reseach strategy and conceptual/methodological framework for estimating the critical fluxes and filling the gaps identified. The conventional organization and structure given to many of these ten chapters is also disappointing. It has long been recognized that the division between chemical and particulate fluxes is essentially artificial, particularly in

relation to fluvial nutrient and heavy metals transport. Whilst some limited data on sediment-associated chemical properties are presented by Meybeck (Chapter 4), sediment-associated nutrient and contaminant transport is largely ignored.

Furthermore, in the conclusion to the overview, it is argued that: 'In order to determine response times there is a need for well-dated high-resolution geologic records, especially those of short term events. Some lakes, for example, are likely to have a sedimentary record of atmospheric fluxes as detailed as that obtained from ice cores' (p. 11). Despite this recognition, the growing body of palaeoecological and palaeoenvironmental evidence, including that derived from lake sediment-based reconstruction (cf. Berglund, 1990), is totally ignored. Whilst there is no global database of lake and reservoir reconstruction, some of the critical regions for increased sediment flux following late-glacial ice retreat have well-documented changes in sediment yield, often at finely resolved timescales. Thus, the volume does not provide quite the comprehensive review promised in the preface. However, the chapters themselves are well-written and authoritative and contain many new perspectives on available global data bases. For the hydrologist and fluvial geomorphologist, the individual contributions to this volume are therefore well worth reading, although as a comprehensive state-of-the-art review it is sadly lacking in a number of key areas.

Variability in Erosion contains 54 pre-published research papers presented at the IAHS Canberra symposium, which have been organized into six major themes: (1) soil erosion, sediment transport and sediment tracers; (2) flood plains and lake sedimentation; (3) large basins and regional variations; (4) small basins; (5) human impacts; and (6) techniques. As a proceedings volume the subdivision of chapters is retrospective and the contents reflect the research activities of those contributors able to attend the meeting. The 54 papers were contributed by authors representing 25 countries. Papers are presented on variability in most of the world's major geographical regions, with the exception of Africa and the Middle East, and a relatively minor contribution from the USA. Nevertheless, the volume is not dominated by Australian research, despite the location of the conference, and the reader of this volume will be exposed to a wide range of environments which pose very different problems in analysing and interpreting soil erosion and sediment transport data.

Like many IAHS publications, the quality of papers is variable. However, the organizers and editorial committee should be congratulated for attracting a wide range of contributions dealing with a number of critical issues. Like *Material Fluxes*, this publication reflects academic interest in sediment transport at a range of spatial and temporal scales, as well as the techniques currently used to estimate flux rates and sediment sources. Whilst it is not possible to provide a comprehensive review of all papers in this volume, two papers (deBoer, pp. 125–132, and Desloges and Gilbert, pp. 133–142) directly address the problems of reconstructing environmental disturbance and extreme event contributions to sediment yields from dated lake sediment sequences, which begin to address one of the fundamental issues raised in *Material Fluxes*. Other contributions identify the significance of river regulation for sediment delivery (Olive *et al*., pp. 241–249) and temporal changes in the contribution of gully erosion to the sediment yield of a Norwegian river system (Bogen *et al*., pp. 307–315). The short cameos presented in *Variability in Erosion* provide stimulating discussions and observations on a wide range of topical geomorphological issues and techniques, consider fundamental problems of isolating measurement reliability from inherent natural variability, and provide an excellent source of information on current research activities concerning stream erosion and sediment transport.

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PHYSICS FOR GEOLOGISTS by Richard E. Chapman, University College London Press, London, 1995. No. of pages: 143. Price: £12.95 (pb), £35.00 (hb). ISBN 1-85728-260-4 (pb).

This book undoubtedly addresses a real need for many students within the broadly defined Earth Sciences – a refresher/primer on some of the basic principles of physics. It has the essential quality that it is extremely easy to read, and the style of explanation is generally excellent. This will relieve many students, who may be daunted by an exhumation of principles taught way back in the dark murky hollows of their educational graveyard. So put away the crosses and garlic, this is a book almost to leave on your coffee table or draining board. In this sense it is a success, and can be recommended as background for a wide range of Earth Science undergraduate courses.

The book is structured into 12 chapters of various lengths covering 'basic concepts' (dimensions and dimensional analysis), forces, optics, atomic structure, electromagnetic radiation, heat and heat flow, electricity and magnetism, stress and strain, sea waves, acoustics, fluids and flow and a final seven pages on the dangers of linear regression. Phew! With all this in only 143 pages something had to suffer, which indeed it has given the brevity of some chapters. Other chapters also seem a little isolated (those on sea waves and linear regression being the most lonely).

There are some frustrating facets to this book. For instance, the references supplied for further use are not up-to-